# Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

held at 10:40 o'clock, thus breaking pleasantly the work of a long session. Each member of the faculty is assigned a morning far enough in advance to admit of making complete preparation. The leader should select for the morning reading something brief and correlated. The selection should be the best poetry, with an occasional bit of prose. The selection should be inspiring, and not merely descriptive. The Bible may be freely used for its magnificent poetry and prose, and also its divine lessons.

**Marching:** Owing to the shortness of the morning exercise period, economy of time is necessary. In order that not a minute may be lost, the pupils in the different classes march to the assembly hall. At three strokes of the bell they cease work or play, and quickly form in line. At another stroke of the bell they march, without command from the teachers, each class led by a marshal. At the close of the exercises the classes march back to their rooms. Besides saving time, marching promotes orderliness and self-control, and makes it possible for the whole school to leave the building without accident in case of fire. To make the marching effective the pupils observe these rules:

KEEP STEP.
KEEP YOUR DISTANCE.
KEEP YOUR CHEST UP.
KEEP YOUR MOUTH SHUT.

**The Faculty:** Every member of the faculty should take an active, sympathetic part in the morning exercises. They should be promptly on hand with the classes. At any time there is opportunity to put in the right word in the right place, they should encourage the school to individual action by appropriate quotations or suggestions. The members of the faculty can come in strongly when there is any lull in the interest, or any gap in the exercises.

**The Results:** The effects of morning exercises should be promptly used in class and grade for the promotion of character and community life.

# Plant Devices

## Wilbur S. Jackman

It is interesting to observe that no matter how different the societies to which they belong may be, all plants have precisely the same life problem to solve. They do this by utilizing the same things and by employing practically the same means. That is to say, the plant in any environment establishes itself and preserves itself through relationships which it maintains between itself and the sunshine (light and heat), moisture, and the mineral world. These relationships are brought about by certain exposures which the plant is able to make to the impinging forces, and its adaptations to extremely diverse environments are but the measures of such exposures.

In maintaining its different relationships, a primary question with the plant is that of its physical support. In the aquatic societies this problem is reduced to the minimum on account of the buoyancy of the water. The specific gravity of the plant, in certain instances diminished by vesicles, relieves the stem of the responsibility of support, and almost the whole plant becomes devoted to the question of exposure to light. The moisture relation of such plants is so simple, also, that special structures or exposures are scarcely needed.

With the water plants that become anchored in the mud at the bottom, such as bulrushes, the life problem becomes decidedly more difficult. There are now three exposures—one to the soil, another aquatic, and a third aërial. In our zone the difficulty of the problem is much enhanced by the extremes of temperature which affect so differently the three media, earth, water, and air. The part of the plant exposed to the air is subjected to the greatest extremes; that part exposed to the water to considerable variation within narrower limits, while the bottom mud offers heat conditions that are fairly stable. The plant's mode of meeting or evading the difficulties is most ingenious. In the first place it keeps its stem under water, and as a result it is buried in the debris at the bottom and becomes an underground stem. Next, to secure its light exposure it sends to the surface, and above it frequently, stem-like leaves which are stiff enough to support themselves when they are above the surface. In other instances, as with the water lilies, where there is a spread of leaf area, the blade lies on the surface, which much simplifies the problem of support. When the food-making season is over, these plants find it most expedient to sever those relations with the outside world which have been established through the leaves. They find it easiest to drop the structures which have maintained these relations, and to preserve the soil exposure alone as presenting the most stable, hence the most favorable, heat conditions. Incidentally, the difference in the mechanics of the various stem-like leaf structures of such plants as the bulrushes, water lilies, and flags renders a different water exposure possible for each — the first named being the advance, and the last the rear guard of the rooting plant procession toward the deep water.

On the shore, where the supporting power of the water is absent, in order to secure an extended light relation, most plants resort to the device of the upright stem, upon which, in an almost infinite variety of ways, the leaves are spread. This device now becomes possible, because the more solid ground affords a fair anchorage by means of the roots. These plants have gained much in their relations to light, but they have lost something, too. They are exposed to the sudden changes and the wide extremes of temperature to which the air is subject. Unprotected by water, the surface soil becomes subject to extremes almost equally great, and hence many of these plants give up every structure offering exposure, and trust the future to the seed, which, physiologically, has no more of an exposure than the underground stem at the bottom of the pond. In addition to their mechanical function, the roots are now the chief exposure by which the plant establishes its water relation; hence they are relatively more numerous and more widely spread.

On the drier ground, the competition among plants in extending their light exposure becomes intense. To that end great stems with spreading branches are shot up higher and higher. This is made possible by the fact that the dry ground affords a firm anchorage. The increasing height is made possible through the stiffening of the stems, partly by the mineral matter which is gradually deposited by the processes of growth. The water relation in dry ground presents a serious problem. To meet it the roots undergo indefinite division, and are sent out singly and in clusters far and wide to take up every drop of available moisture. Even the good offices of the leaves are enlisted. They, in some instances, funnel the rain and dew down the stem to the roots, and in others shed it off like a roof to the periphery of the root sphere, where there are the most delicate root-tips. This increased spread of root makes it mechanically possible, too, for the plant to carry its light exposure to positions of greater advantage. Many of such plants, the trees and shrubs, have found the habits of the marsh and water plants, that give up most of their structures at the close of the growing season, most extravagant. The former have learned how to protect the essential part of those structures through which the plants make their different exposures. This means an immense advantage to the plant in added possibilities of growth.

As the drier portions of the earth are encountered, the light remaining essentially the same, the plants turn their attention more and more to the solution of the water question. The trees in the great forest areas of the globe can do with nothing less than oceans of rainfall; but many members of the grass tribe, by a most ingenious leaf device and a prolific root development, can thrive where dews almost take the place of rain. In still drier regions the thin spreading leaf structures are abandoned, and the responsibility of maintaining both the light and water relation is assumed by the stem, as in the cactus, where the whole plant becomes a kind of reservoir. Thus it has been, by infinite pliability and patience, that the plants have persisted through millions of years, developing, growing, and spreading until there is scarcely a square foot on the globe that has not been occupied by them.

# Spring Studies

Ira B. Meyers

### Tree Growth: Relation to Form Structure and Wood Properties

From the first awakening of life in germination through all its life stages to old age and decay, the tree is subject to the varying influences of heat, light, moisture, soil, winds, animal life, and other plants. The total of these external influences is called the tree's environment. The living tree must adjust itself to the constant and varying influences of its environment. To assist it in its adjustment it has certain structures or organs which develop in form and arrangements according to their function and the nature of the tree environment.

Our study of the tree should help us to understand something of the function of its various structures, and how these functions are performed.

It should tell us why one tree is tall and another spreading; why one has an oval and another a conical top; why one tree leaves before it flowers and another flowers before it leaves. Our observations should help us to discover why so many seeds germinate and so few mature; they should enable us to find out from these silent objects their reasons for living and growing as they do.

To do this, we must find out the needs of the tree, and how it supplies these needs in sufficient quantities for living.

I. General Observations.

1. Outline form of unfoliaged trees. (a) Top. (b) Trunk.
2. Variation of form in trees of the same variety. (a) Isolated. (b) Woodland.
3. Variation of form in trees of different species.
4. Try to determine conditions and adaptations which influence tree form.
5. Make drawings showing characteristic forms.